



# Expansion Strategy For The TRI Information Management System



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## Executive Summary

In 1986 Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA) to provide citizens with the "right to know" about toxic chemicals in their communities. By July 1 of each year, facilities must report to EPA their releases of toxic chemicals to the environment if the facilities are in the manufacturing sector, have ten or more full-time employees, and manufacture, process, or import more than certain amounts of listed chemicals and categories. As required by EPCRA, EPA makes this data publicly available in a database called the Toxics Release Inventory (TRI).

Congress and the public have expressed a desire to expand TRI reporting to cover additional chemicals and facilities. EPA plans to expand TRI reporting requirements in two phases. In phase I, EPA is adding approximately 350 chemicals to the list and considering establishing an alternative reporting threshold for facilities with small volume releases. In phase II, EPA will require facilities in certain non-manufacturing industries to submit reports. EPA must ensure that it has the capacity to process the expanded number of annual forms.

EPA has created the TRI Information Management System to process TRI forms. The system consists of EPA *performance goals* and EPA *resources*. The performance goals ensure *accuracy* of data, *timeliness* of release of the data, and *availability* of the data to the public. EPA resources consist of the *processing facility*, the *processing system*, *EPA staff*, and the *budget* to pay for facilities, equipment and contractor services. All processing is done at the EPCRA Reporting Center (ERC) in Ballston, Virginia.

EPA defines the capacity of the TRI Information Management System as the number of data elements that can be processed during a reporting cycle using available EPA resources while meeting goals for accuracy, timeliness and availability. A data element is a single unit of information on the reporting form (e.g., a facility name, a release number).

For reporting year 1991, EPA processed 9.6 million data elements. Phase I chemical expansion will add about 3.6 million data elements. If EPA implements the small volume release provision, about 1.4 million data elements will be eliminated. With the small volume release provision, phase I expansion will increase the number of data elements EPA must process by 2.2 million, or 23 percent over 1991.

The number of data elements that will be added in Phase II facility expansion depends on final decisions about which non-manufacturing industrial categories should be included.

EPA has determined that the processing capacity of the current TRI Information System is about 20 million data elements per reporting cycle. This is based on an analysis of operations during the 1991 reporting cycle and implementation of enhancements such as document imaging and the addition of extra

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processing workstations and shifts. Phase I expansion along with the small volume provision will result in about 11.8 million data elements per year, well within the processing capacity of the existing TRI Information Management System.

The processing capacity of the system is highly dependent on the number of forms that are electronically submitted. The processing capacity with no electronic submissions, i.e., all forms are submitted on paper, is about 12 million data elements. All forms will have to be electronically submitted to reach the maximum capacity of about 20 million data elements.

There is significant potential to increase the number of electronic submissions. For reporting year 1991, 12 percent of all forms were electronically submitted. This increased to 35 percent for reporting year 1992. EPA believes that with voluntary efforts, 60-70 percent of all forms could be electronically submitted, resulting in a system capacity of 17-18 million data elements per reporting cycle. Depending on the number of electronic submissions, EPA could add up to eight million data elements (almost 80,000 forms) from phase II facility expansion using the existing information management system.

Because of the importance of electronic submissions to TRI processing capacity, EPA is pursuing several approaches to increase electronic submissions. EPA is encouraging companies that submit the large numbers of forms to submit them electronically. EPA will begin an evaluation and pilot of electronic data interchange (EDI) during fiscal year 1994.

This paper does not address capacity beyond 20 million data elements per reporting cycle. Exceeding 20 million data elements would require substantial revision of the information management system.

# Expansion Strategy for the TRI Information Management System

## Introduction

In October of 1986, Congress passed the Superfund Amendments and Reauthorization Act (SARA). Title III, Section 313 of SARA, also known as the "Emergency Planning and Community Right-to-Know Act" (EPCRA), is based on the premise that citizens have a "right to know" about toxic chemicals in their communities.

EPCRA requires certain businesses to submit annual reports on the amounts of toxic chemicals their facilities released into the environment or are transferred away from their facilities to other sites. EPCRA also mandates that an inventory containing this data be established and made publicly available through a computer database and other means. The Toxics Release Inventory (TRI) was established by EPA to meet these legislative requirements.

The TRI has been very successful in informing citizens about toxic chemical releases. There is a great deal of interest on the part of Congress and the public in increasing the utility of the TRI. EPA is considering various options for expansion, and Congress is considering new legislation that will expand EPCRA's coverage.

EPA spends considerable resources processing TRI submissions and making the information publicly available. Any expansion of reporting requirements must be carefully managed to ensure that accurate data can continue to be made available to the public in a timely manner.

EPA must ensure that the TRI Information Management System has adequate capacity to process TRI forms. EPA defines the capacity of the TRI Information Management System as *the number of data elements that can be processed during a reporting cycle using EPA resources while meeting goals for accuracy, timeliness, and availability.*

## The Current TRI Workload

Section 313 of EPCRA mandates facilities to report if, during the calendar year, they meet the following conditions:

- Are in the manufacturing sector (SIC codes 20-39); and
- Have ten or more full-time employees; and
- Manufacture, import, or process 25,000 pounds or more of a listed chemical, or use 10,000 pounds or more of a listed chemical. There are currently about 350 chemicals and chemical categories on the list.

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By July 1 of each year, owners or operators of facilities that meet these criteria must submit reports to EPA for the previous calendar year. Reports are submitted on the Toxic Chemical Release Inventory Reporting Form, also known as Form R.

For the 1991 reporting year, EPA processed about 93,000 forms (facilities submit one form per chemical). Of these, about 12 percent were electronically submitted; the remaining 88 percent were submitted on paper. The 93,000 forms represent about 9.6 million data elements.<sup>1</sup>

The number of forms per year has remained fairly consistent since 1987, the first reporting year. Prior to the 1991 reporting year, EPA entered 64 data elements per form. In 1991, with the addition of pollution prevention information required by the Pollution Prevention Act of 1990, the number of data elements entered from Form R increased to 103.

### **TRI Expansion Strategy**

EPA is proposing to expand TRI reporting in two phases. In phase I, EPA will focus on adding chemicals to the chemical list. In phase II, EPA will focus on adding non-manufacturing industries to the facility list. EPA has chosen to focus on chemicals first because screening has already been accomplished on many candidates and there is a well established process for chemical list modification. Facility expansion will occur later because it requires substantial analysis and justification.

For phase I, EPA has identified about 350 chemicals that meet the statutory criteria for addition to the list and are produced in sufficient quantities to justify annual reporting. These include ozone depleting chemicals (HCFCs), RCRA chemicals, pesticide active ingredients and about 150 other chemicals drawn from Right-to-Know More legislation and other Federal statutes such as the Clean Air Act and Clean Water Act. Federal facilities are also being added under phase I.

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<sup>1</sup> A data element is a single unit of information reported on Form R. (e.g., facility address, number of pounds of the chemical released to the air) that is entered into the TRI Information Management System. The number of data elements processed in a reporting cycle, is calculated by multiplying the average number of data elements entered per form by the number of forms received in the reporting cycle. There were 103 data elements entered into the system for each 1991 form, and 93,000 forms submitted (including prior year revisions) resulting in the processing of 9.6 million data elements for the 1991 reporting cycle.

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EPA is considering an alternative threshold for small volume releases. Under this provision, EPA would establish a higher threshold for a category of facilities that have releases below a certain volume level. Facilities that fall below this release volume would not be required to submit a full TRI report. Only a shorter certification statement would be required.

EPA estimates that phase I expansion, which will be implemented in reporting years 1994 and 1995, will add about 35,000 new forms in each reporting cycle, resulting in an additional 3.6 million data elements.

EPA estimates the small volume provision might be implemented in reporting year 1995 and could replace about 20,000 full reports with shorter certification statements. This would eliminate about 1.4 million data elements per year.

For phase II, which will be implemented after reporting year 1995, EPA will add reporting by non-manufacturing facilities that contribute significant release volumes. Adding these facilities will provide a more complete picture of the sources responsible for chemical releases in a community. The number of new forms will be based on final decisions about which non-manufacturing should be added.

| <b>Table 1<br/>TRI Expansion Schedule</b>  |             |                         |                                       |                       |
|--|-------------|-------------------------|---------------------------------------|-----------------------|
| <b>Phase</b>                               | <b>I</b>    |                         |                                       | <b>II</b>             |
| <b>Reporting Year</b>                      | <b>1993</b> | <b>1994</b>             | <b>1995</b>                           | <b>1996</b>           |
| <b>Chemical Expansion</b>                  |             | RCRA U<br>List,<br>HCFC | RTK More<br>Lists,<br>Pesticide<br>AI |                       |
| <b>Facility Expansion</b>                  |             | Federal<br>Fac.         |                                       | Non-<br>Mfgr.<br>Fac. |
| <b>Small Volume Provision</b>              |             |                         | Cert.<br>Stmts.                       |                       |
| <b>Number of Forms</b>                     |             |                         |                                       |                       |
| Full Forms                                 | 93,000      | 100,000                 | 108,000                               | To be                 |
| Cert. Stmts.                               |             |                         | 20,000                                | Deter-                |
| Total Forms                                | 93,000      | 100,000                 | 128,000                               | mined                 |
| <b>Number of Million Data<br/>Elements</b> |             |                         |                                       |                       |
| Full Forms                                 | 9.6         | 10.3                    | 11.1                                  | To be                 |
| Cert. Stmts.                               |             |                         | 0.7                                   | Deter-                |
| Total Forms                                | 9.6         | 10.3                    | 11.8                                  | mined                 |

## **The TRI Information Management System**

EPA has established a TRI information management system to meet its responsibilities under EPCRA. The system consists of two components: EPA performance goals, and EPA resources. The performance goals ensure that accurate, timely information is made available to the public. The resources provide the means to accomplish the goals. Both the performance goals and the resources combine to define the capacity of the TRI Information Management System to process TRI information.

### ***EPA Performance Goals***

EPA has established three performance goals:

- Accuracy,
- Timeliness, and
- Availability.

#### ***Accuracy***

To be of use to the wide variety of users envisioned in the EPCRA legislation, the information in the TRI database must be accurate. The accuracy goal consists of two sub-goals.

The first accuracy sub-goal ensures that the TRI database accurately reflects what is reported by facilities. EPA has defined this component as achieving near 100 percent data entry accuracy for certain key data fields, particularly those fields that characterize chemical releases, and over 98 percent data entry accuracy for all fields. EPA has consistently achieved this goal. A 1991 GAO investigation of data quality on 11 important fields found 99.7 percent accuracy for 1988 reporting year data. EPA's own audit of about three percent of reporting year 1990 forms found a data entry accuracy rate of 99.5 percent for release value fields.

EPA uses several processes to maintain this high level of data accuracy. All release numbers are reviewed after data entry. In addition, three percent of all forms are subject to verification of data entry of all data elements. All submitters receive a printout of their release and transfer data after entry into the system and are given an opportunity to verify its accuracy.

The second accuracy sub-goal ensures that facilities accurately report their releases. This is accomplished through guidance materials, a technical support hotline, facility inspections and, if necessary, enforcement actions.



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Identification of non-submitters is a high priority. EPA sends submitters a notice of technical error (NOTE) when it identifies errors on the reporting form. EPA provides technical and compliance support to submitters to correct errors. EPA sends to states reports of major facility releases and gives states an opportunity to identify errors. EPA, along with states, conduct a considerable amount of outreach and training. EPA provides a technical hotline to ensure that facilities have every opportunity to submit accurate information.

### *Timeliness*

Data must be available to users within a reasonable time after it is submitted to EPA. EPA has defined the timeliness goal as releasing the data to the public in an on-line database within nine months of the July 1 reporting deadline. Meeting this goal requires that EPA balance the need for accurate data with the public's desire to have it as quickly as possible.

EPA achieved the nine month goal for the first time with reporting year 1991 processing. EPA processed reporting year 1991 forms between September 1992 and April 1993.<sup>2</sup> Despite the shorter time available and the increased number of data elements (from 6.0 million for 1990 to 9.6 million for 1991), EPA was able to achieve its goal to complete data processing by the beginning of April, 1993. The public release of the 1991 data occurred during May, 1993. EPA is on schedule to release 1992 data in April, 1994.

### *Availability*

The availability performance goal ensures that EPA meets its statutory mandate to make TRI data available to the public on-line and through other means. EPA recognizes that the public consists of many different types of users with varying needs. The primary mechanism for making TRI data available is on-line through the National Library of Medicine (NLM). This is an easily accessible database with a nominal charge for on-line usage. EPA also makes TRI data available on-line through RTK Net, a database used mainly by environmental and public interest groups. States and other government users can access the TRI data on EPA's mainframe

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<sup>2</sup> Data processing would normally have started in July. However, the 1991 reporting form contained new data elements added by the Pollution Prevention Act. Approval of the revised FY 1991 reporting form was delayed. EPA therefore exercised enforcement discretion and allowed companies to submit 1991 reports by September 1 instead of the statutory July 1 deadline. Data processing for the 1991 forms therefore started in September.

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computer. EPA also makes data available through other means such as a written reports, magnetic tape, computer diskettes, and CD-ROM.

EPA has a number of projects underway to assess the public's use of the information and to find new ways to make it accessible. EPA is investigating ways to link TRI data with other kinds of environmental data to enhance data usefulness.

### ***EPA Resources***

EPA resources consist of four components:

- Budget,
- Staff,
- Processing Facility, and
- Processing System.

#### *Budget and Staff*

The EPA budget is the dollars available to pay for facilities, equipment, and contractor services. For Reporting Year 1991, EPA spent about \$5.6 million for TRI information processing. This required 16.6 EPA full time equivalent (FTE) staff.

#### *Processing Facility*

The processing facility is the site at which TRI forms are processed and stored. The facility must be large enough to accommodate the contractor-run operation. This includes room to receive and store forms, and room for data entry workstations. In October, 1992 EPA moved the EPCRA Reporting Center (ERC) to a new, larger facility in Ballston, Virginia to accommodate expansion from the PPA and to prepare for future expansion.

#### *Processing System*

The processing system includes procedures and equipment to process and quality assure TRI data, make the data available, and archive forms. It also includes computer hardware and software. The current processing system includes a local area network (LAN) at the EPCRA Reporting Center (ERC) and the EPA mainframe at Research Triangle Park, North Carolina.

***Information Processing***

The information processing budget consists of six components needed to prepare the data for use. These are:

- ***ERC Fixed Costs:*** Cost of rent for the EPCRA Reporting Center, contractor management overhead, EPA program management overhead, and form storage.
- ***Data Entry:*** Cost to receive forms and enter them into the computer system. This cost is highly dependent on the number of forms, the number of data elements per form and whether the form is submitted on paper or electronically. It costs EPA much less to enter an electronic form (i.e., one submitted on diskette) than it does to enter a paper form.
- ***Data Quality:*** Cost to quality assure the data. This includes reviewing forms for accuracy, generating notices of noncompliance (NONs) and notices of technical error (NOTEs), data reconciliation, providing submitters with an opportunity to review the accuracy of their reports after the data is entered, and ensuring that a submitter's forms can be linked across multiple reporting years. This cost is also highly dependent on the number of forms and data elements per form. Forms submitted electronically generally require less quality assurance effort than paper forms.
- ***Magnetic Media:*** EPA provides submitters, free of charge, a computer program that runs on IBM compatible computers. This program allows a company to submit its TRI reports on a diskette, i.e., electronically. This budget component includes the cost to produce the program, provide user support, and provide support to some vendors who independently produce their own versions of the reporting program.
- ***Computer Systems:*** Cost to maintain computer systems to process and store the data. Data is originally entered on a local area network (LAN) at the ERC. Data entry verification and some quality assurance is done before the data is uploaded to EPA's mainframe. Additional quality assurance is done on the mainframe. The mainframe contains the official version of the TRI known as TRIS. It is accessible by EPA and states. This category includes the cost to maintain the mainframe and LAN hardware and software, and to modify the software to accommodate changes in reporting requirements.
- ***Data Analysis:*** Cost to develop tools to use TRI data, analyze data to support EPA needs, and prepare data for use by others.

Table 2 summarizes the cost of TRI information processing for Reporting Year 1991.

| <b>Table 2<br/>Cost of TRI Information Processing for<br/>Reporting Year 1991</b> |             |                                |
|---|-------------|--------------------------------|
| <b>Category</b>   | <b>FTEs</b> | <b>Dollars<br/>(Thousands)</b> |
| ERC Fixed Costs   | 3.0         | 1,650.0                        |
| Data Entry  | 3.6         | 2,159.0                        |
| Data Quality  | 3.3         | 785.0                          |
| Magnetic Media  | 1.1         | 180.0                          |
| Computer Systems  | 2.8         | 540.0                          |
| Data Analysis   | 2.8         | 280.0                          |
|   | -----       | -----                          |
| Total   | 16.6        | 5,594.0                        |

## Capacity of the TRI Information Processing System

### *Efficiency Evaluations and Improvements*

The TRI Information Management System began operation in 1988 to process forms for reporting year 1987, the initial reporting year. Recognizing the need to make the operation as efficient as possible, EPA contracted with a management consulting firm to evaluate EPCRA Reporting Center operations. In July, 1990, EPA received the final consultant report. The report contained numerous recommendations, the most important of which were:

- Combine two separate contracts (one for systems development and another for forms processing) into a single contract to improve management and operational efficiency.
- Develop and distribute of a software package to allow companies to submit TRI data on microcomputer diskette.

These recommendations, along with others, were implemented.

In August, 1992, the same consultant completed a follow-up study which examined ways to expand the system to handle more

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forms. The report concluded that EPA would have to fundamentally redesign the information management system if it became necessary to expand TRI beyond 14-15 million data elements per reporting cycle.

EPA did not accept the consultant's conclusions about the limit on the number of forms that could be processed during a reporting cycle. In September, 1992 EPA staff conducted a comprehensive review of system operations with the goal of identifying ways to increase system efficiency. Based on that review, EPA implemented the following actions for processing reporting year 1991 forms:

- Expansion of the night shift for data entry allowing about 30 percent more data to be entered.
- Institution of preventive maintenance versus reactive maintenance of computer systems resulting in no major down time, allowing full operation over all shifts.
- Expansion of the LAN by adding another file server, allowing simultaneous data entry and data reconciliation operations to be conducted.
- Enhancement of the LAN data entry software to increase the efficiency of data entry operators.
- Establishment of a computer system to track all forms by using barcodes, resulting in substantially increased efficiency by reducing the waiting time for forms needed during data reconciliation.

Experience gained while processing 1991 forms, which was started in September, 1992 and was completed in April, 1993, has confirmed that implementation of the above measures substantially improved reporting center operations. For reporting year 1991, EPA faced a 60 percent increase in data (from 6.0 million for 1990 to 9.6 million for 1991) and a two month shorter time period to process the data. Despite the shorter time available and the increased number of data elements, EPA was able to achieve its goal to complete data processing by the beginning of April, 1993. About 60 percent more data was processed in 20 percent less time than in previous years.

Additionally, in the Fall of 1992, EPA received a preliminary report from the EPCRA Reporting Center contractor suggesting that the LAN used by the ERC for data entry could be expanded beyond its current capacity. Further analysis and the experience gained while processing the 1991 reporting year forms has proven that the LAN can be expanded further while maintaining efficient operations.

***Analysis of the Processing Capacity of the Existing TRI Information Processing System***

Reporting Year 1991 is the base year for the capacity analysis. For that year, the ERC operated at full capacity and processed a total of 9.6 million data elements (MDE).

EPA has identified several additional areas where the capacity of the existing system can be increased. These are:

- General efficiencies which include minor improvements such as changes in document handling procedures.
- The implementation of a document imaging system, scheduled for July, 1994. This will reduce delays in processing due to unavailability of files for data entry and quality assurance.
- Additional workstations for data entry and reconciliation and an expanded shift during peak processing periods.

EPA has analyzed the potential increase in capacity from these improvements and the impact of electronic submissions on processing capacity. Based on this analysis EPA has developed a model of the processing capacity of the existing TRI information management system as a function of the percentage of electronic submissions. The model estimates that the system capacity ranges from 12 MDE with no electronic submissions to 20 MDE when all forms are electronically submitted.

The capacity of the existing TRI information management system is highly dependent on the number of forms electronically submitted. The capacity of the system increases as the percentage of electronic forms increases. Figure 1 shows the percentage of electronic forms required to achieve various levels of system capacity. The maximum capacity of the existing system with the proposed improvements (20 MDE) can be achieved if all forms are electronically submitted.

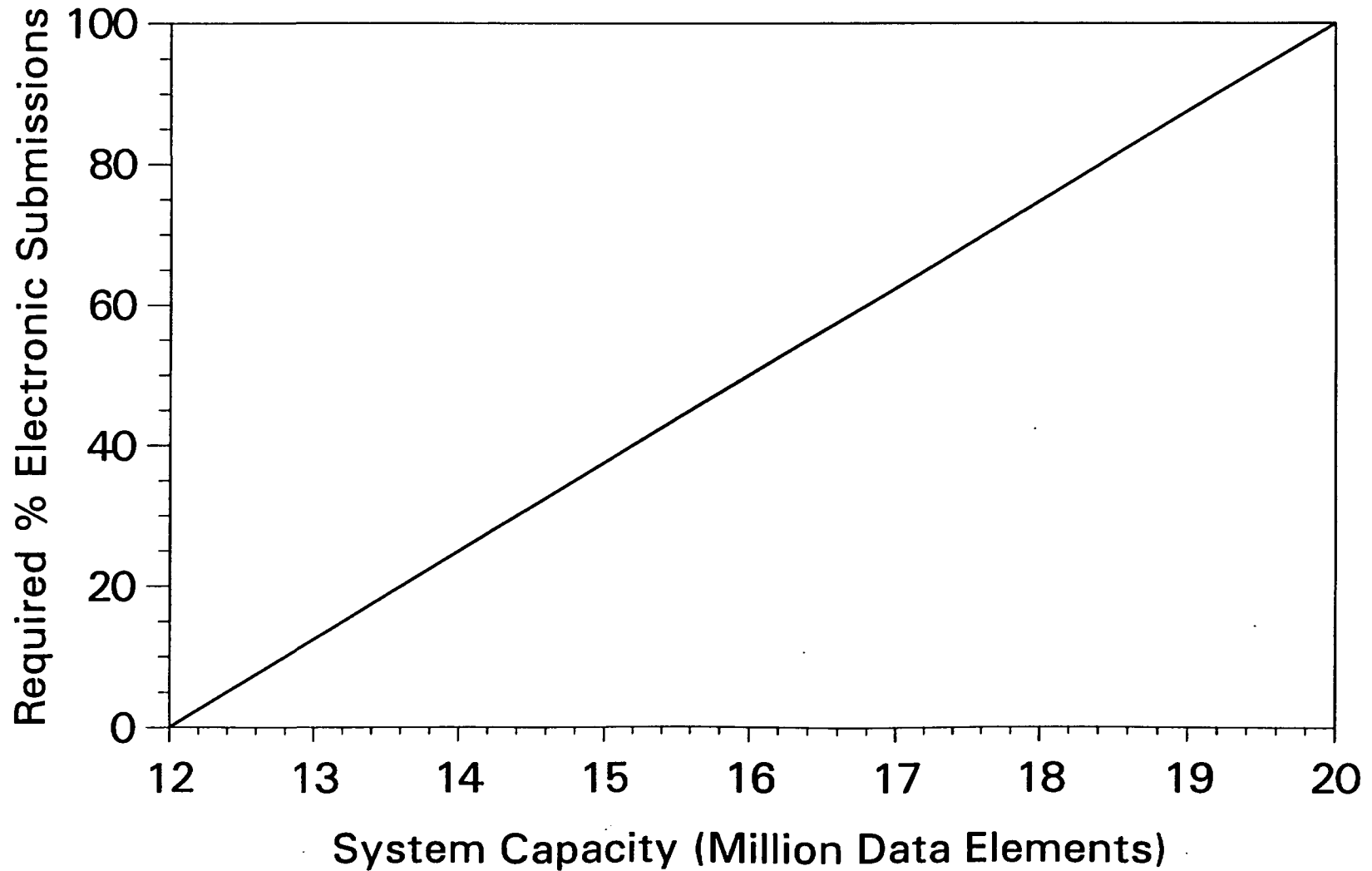
***Potential for Electronic Submissions***

There is significant potential for increasing the number of TRI forms electronically submitted. The number of electronic forms increased from 12 percent in Reporting Year 1991 to 35 percent in Reporting Year 1992. In Reporting Year 1992, about 1,000 parent companies (out of about 22,000 companies) accounted for almost 40 percent of the electronic forms. If these 1,000 companies had submitted all their forms electronically, the overall percentage of electronic submissions would have increased from 35 percent to about 50 percent.

EPA's strategy on electronic submissions is to make a special outreach effort to the companies that submitted the most

Figure 1

# Required % Electronic Submissions To Reach System Capacity



paper forms in Reporting Year 1992 to encourage them to electronically submit their Reporting Year 1993 forms. In addition, EPA is working with trade associations, such as the Chemical Manufacturers Association, to develop programs to encourage their members to submit electronically. EPA has already enhanced its electronic reporting package to make it more user-friendly and plans to expand user support for Reporting Year 1993. EPA will begin an evaluation and pilot of electronic data interchange (EDI) during fiscal year 1994.

EPA's believes that with voluntary efforts, 60-70 percent of all forms could be electronically submitted. This would make the processing capacity 17-18 million data elements per reporting cycle. To increase to 20 million data elements would require electronic reporting from all submitters.

### **Information Processing Cost of TRI Expansion**

EPA has developed a model for the six categories of cost for information processing (ERC fixed cost, data entry, data quality, magnetic media, computer systems, and data analysis). The model identifies fixed costs and incremental costs that vary with the number of forms to be processed.

The major saving from electronic submissions is in data entry. There is some saving in data quality because forms electronically submitted tend to require less review and correction.

It costs EPA about \$25.00 to enter a paper form and about \$7.00 to enter an electronic form. As the number of electronic forms increases, the system capacity increases and the total data entry cost decreases. This is illustrated in Figure 2.

Figure 3 shows the relationship between information system capacity and total processing cost. Although the data entry cost decreases as the number of electronic forms increases, other processing costs increase because of the larger number of forms. Once entered, there is little difference in the subsequent processing cost of paper and electronic forms. However, the total cost of information processing remains almost constant because data entry is a large portion of the total processing cost.

### **Conclusions**

The processing capacity of the system is highly dependent on the number of forms that are electronically submitted. The capacity with no electronic submissions, i.e., all forms are



Figure 2  
TRI Data Entry Cost  
At System Capacity

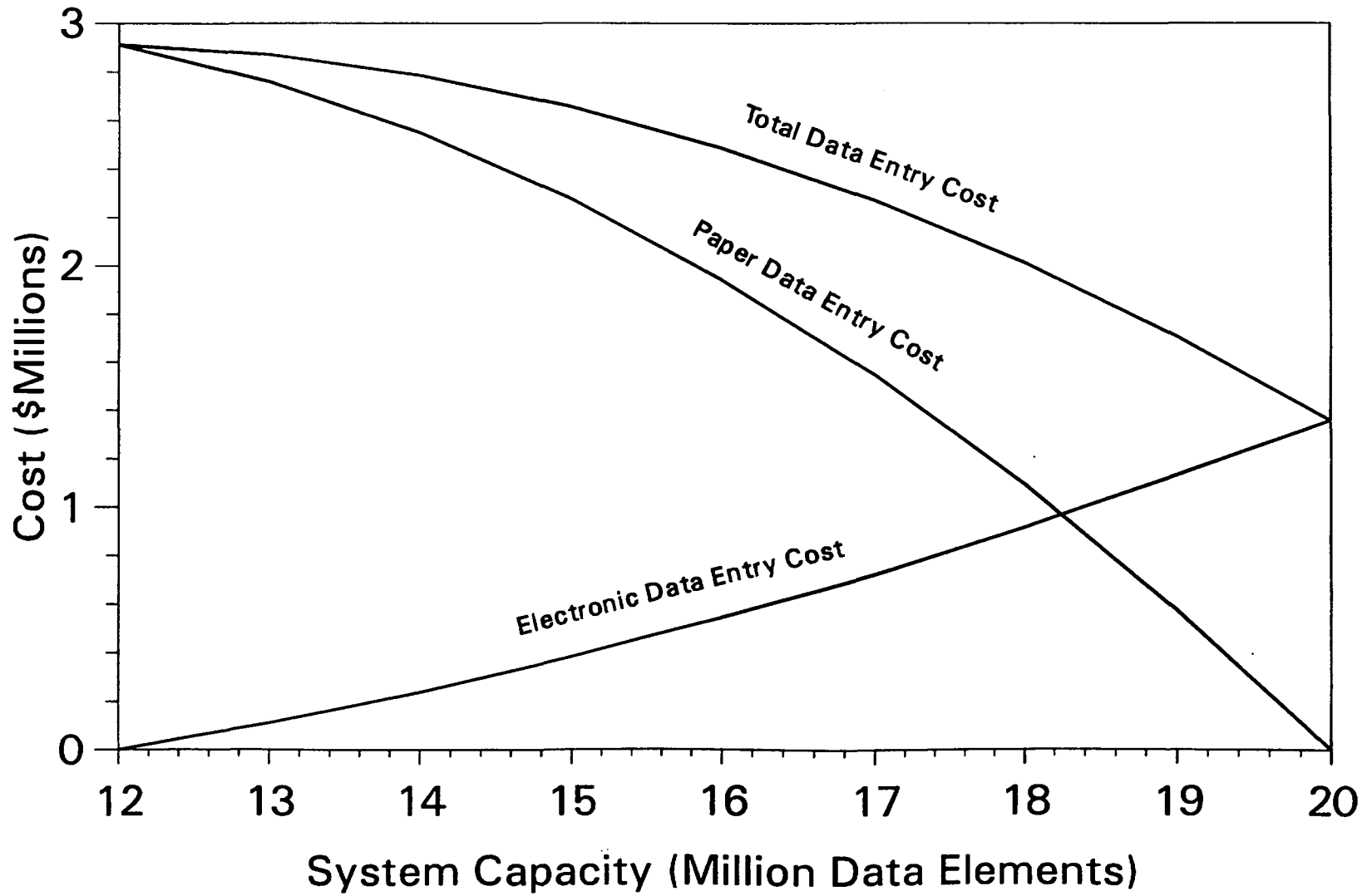
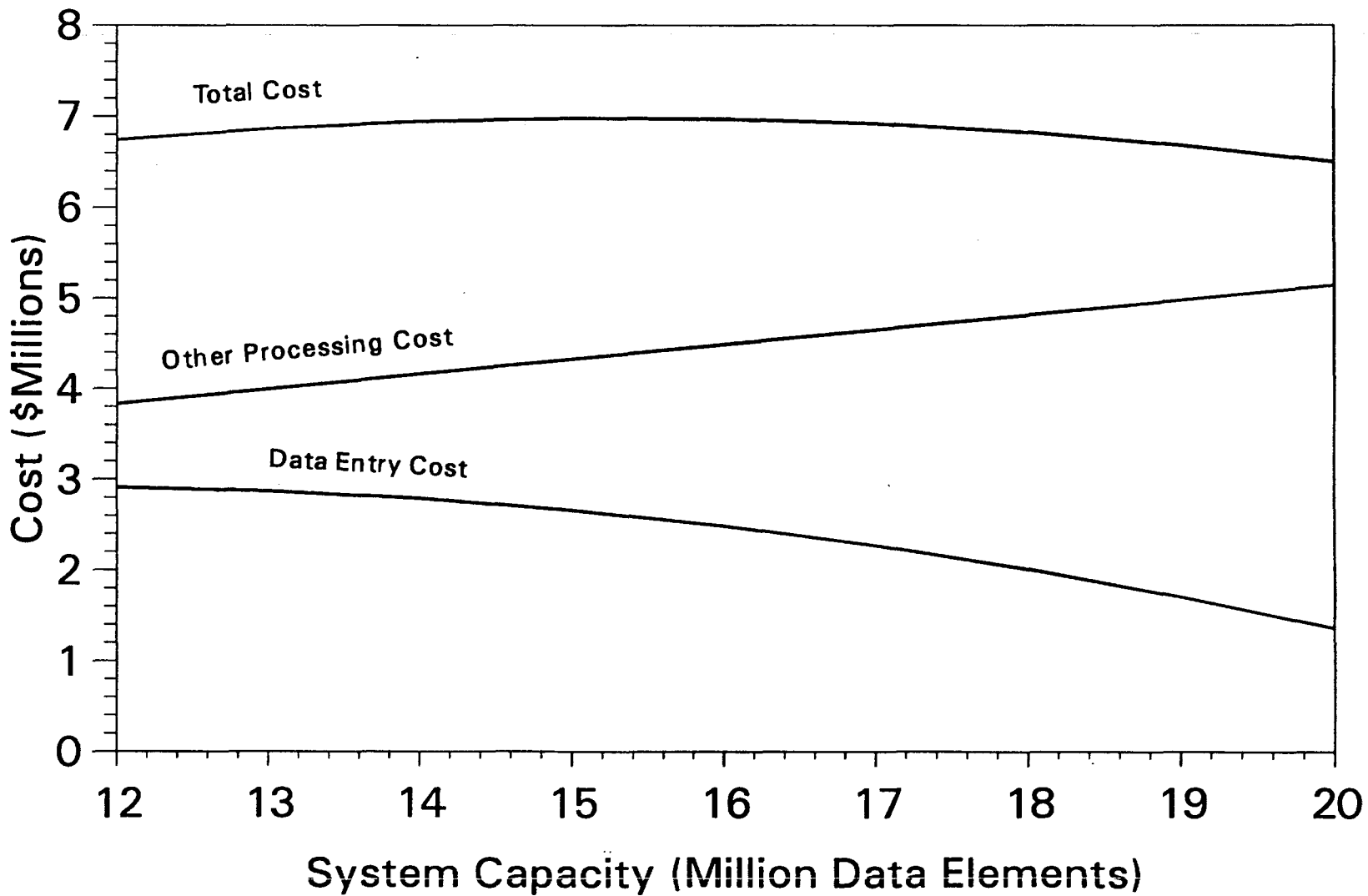


Figure 3  
TRI Information Processing Cost  
At System Capacity



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submitted on paper, is 12 million data elements. To reach the maximum capacity of about 20 million data elements requires that all forms be electronically submitted. EPA believes that with voluntary efforts, 60-70 percent of forms will be electronically submitted, making the capacity of the existing TRI information processing system 16-18 million data elements per reporting cycle.

EPA has enough capacity to process the increased number of forms from phase I chemical expansion. EPA can also add new forms (up to about 80,000) from phase II facility expansion using the existing information management system.

Because electronic forms cost less than paper forms to enter in the system, the total information processing cost remains almost constant as the system capacity increases. EPA can process up to about 20 million data elements per reporting cycle with about the about same budget as required for 12 million data elements because of the larger number of electronic submissions.

This paper does not address capacity beyond 20 million data elements per reporting cycle. Achieving these capacities would require substantial expansion or revision of the information management system.